

# NEWS REPORT

*W. G. Gardner*  
NATIONAL ACADEMY OF SCIENCES  
NATIONAL RESEARCH COUNCIL



Volume IX, Number 4

JULY-AUGUST 1959

## CONTENTS

### FEATURE ARTICLE

- Changing Scope of Highway Research  
*Harmer E. Davis* 53

SCIENCE NEWS ..... 57

RECORD OF MEETINGS ..... 65

NEW PUBLICATIONS ..... 67

---

### EDITORIAL BOARD

FRANK L. CAMPBELL

GLEN FINCH

R. KEITH CANNAN

LOUIS JORDAN

JOHN S. COLEMAN

M. H. TRYTTEN

*Editor:* WALLACE W. ATWOOD, JR.

*Editorial Office:* 2101 Constitution Ave., Washington 25, D. C.

---

*NEWS REPORT* is published bimonthly by the National Academy of Sciences-National Research Council. It is designed to report current activities of divisions, boards, committees, and other established groups within the organization, and to record news of cooperating Societies and developments in the field of international science. It is distributed without charge to organizations and individuals directly associated with the Academy-Research Council; it is available to others at the rate of \$2.00 per year.

# NEWS REPORT

*National Academy of Sciences      National Research Council*

VOLUME IX

July–August 1959

NUMBER 4

## Changing Scope of Highway Research<sup>1</sup>

HARMER E. DAVIS

*Chairman, Highway Research Board*

IN ATTEMPTING to define changing scope of highway research, I should like to highlight what appear to be emerging trends in research activity in the field of highway transportation. The comments which I offer are, in effect, an appraisal of the response in terms of research thought and emphasis to the need for knowledge and understanding of underlying problems of the times—in this instance, the provision of highway transportation. Being an attempt to identify evolving concepts, these comments are naturally a subjective appraisal, so that responsibility for misinterpretation falls upon me, although I hope that a studious examination of the record of thought and effort in this field will bear me out.

As a basis for discussing the nature of research related to highway engineering—or indeed, related to engineering in general—it is pertinent to remind ourselves of the role of engineering in our society. While the activities in which engineers engage are so varied and the range of subject matter so extensive that it is difficult to try to define “engineering” uniquely and adequately,

most engineers would probably agree upon the key or central function of engineering. This may be defined as the creation, in the real world, of feasible and operable systems of facilities or processes, whose performance and cost can be predicted. Essential aspects of this creative process are planning and design (involving conception, analysis and predicting performance, and cost), and direction or control of fabrication, construction, or processing (involving the meeting of time and cost constraints); in both these aspects there is involved the exercise of intellectual skill and judgment in the synthesis of requirements and the compromise of conflicting requirements.

We may view engineering research, then, as that effort related to the development of knowledge of, and the improvement of our understanding of, the systems whose performance must be predicted in order that feasible plans and designs can be made.

In an earlier day, the main focus in each branch or specialized area of engineering was on the physical design of isolated elements and on relatively simple units or operations; by and large, the knowledge was empirical and the predictive process was sometimes an uncertain extrapolation at best. In contradistinction, the economic, social, and technologic development of our

<sup>1</sup> This article is based on a talk presented at the annual meeting of the Division of Engineering and Industrial Research on March 20, 1959. The author is Director of the Institute of Transportation and Traffic Engineering, University of California at Berkeley.

present society is creating an urgent need to analyze and design increasingly complex systems of facilities and processes (for example, whole communication systems, transportation systems, or manufacturing systems). Human factors and biologic processes are receiving and will receive increasing consideration in planning and design. There is growing recognition of the need not only for more rational bases for planning long-range developments under conditions of change brought about by continuous additions to scientific knowledge, but also for predicting the effect or impact of these developments on our societal arrangements. These emerging needs are placing increasing emphasis on research of a high order as an indispensable antecedent of the engineering planning and design process.

In the field of highways and highway transportation, there has been taking place an evolution along the same lines that I have intimated has been occurring in engineering generally. To highlight the trends, I should like to hypothesize four periods or foci of attention with respect to the scope and concept of the system amenable to design and concerning which some attempt was made to infer performance. Obviously no neatly separable periods possessed of unique characteristics existed; practices and concepts changed gradually, and some techniques were present in some or all periods. Rather, I am attempting to identify a kind of central tendency in the scope of engineering design effort.

However approximate may be the setting of these periods, the identification of the changing emphases in the scope of the "system-to-be-designed" is of interest in that it provides a backdrop against which we can view with some perspective the corresponding changes in scope of research in this field.

To attempt to include in this review a discussion of all the elements which comprise a complete transportation system would be too lengthy, thus I shall focus attention here largely on the highway facility aspects of the highway transportation complex. But similar trends are evident whether we trace the developments on a limited or total basis.

### **"Caveat Viator" Period**

In the decades up to say World War I, the focus of technical attention was largely directed to the physical improvement of the traveled way—the roadway itself. Improvements were usually of limited extent; for many itineraries the traveler was fortunate if he had opportunity for continuous passage, and states of improvement (and maintenance) along such routes that could be identified as routes, often varied from nil to passable.

The concept of system as something to be designed was exemplified by a pavement (a system of layers of earth-type materials, designed to resist weathering and support loads), or a bridge (a system of framework, designed to support itself plus loads).

Correspondingly, if we look at the papers and books of that period, we find that investigations and studies of the period largely were concerned with materials, the behavior of combinations of materials, and with the techniques of building these simpler structures. And the application of the existing knowledge was largely on an empirical basis.

### **Road-Network Period**

The period from World War I to World War II, saw the development of identifiable (rural) road networks (e.g., Federal-aid primary highways, various state primary and secondary road networks). Although the design and construction was by separate segments among which the actual standards and methods of design and techniques of construction varied, there emerged concepts of minimum standards of design and criteria of operation. These standards and criteria underwent evolution which increasingly reflected interaction of vehicle and road and over time reflected changing operational characteristics of the vehicles. Concepts evolved of continuous routes of large extent with increasing levels of uniformity of operating standards. During this period we note especially the beginnings of research in traffic engineering. Study of operational requirements led to criteria of geometrical design (as distinguished from physical or structural design); and study of traffic demand characteristics

laid the basis for later thinking concerning planning for mass movement. During this period we note also increasing scientific emphasis in the study and use of materials, and the development of a scientific approach to controlling the behavior of soil, in or on which most roads are built. Increased sophistication in the study of the economics of highway transportation provided a rationale by which the responsibility of users of the highways was related, however approximately and crudely, to costs of providing highway service (although this applied largely to the rural networks). Significantly, the Highway Planning Survey laid an important basis for system and operational study.

### Highway Systems Period

Since World War II we note increasing recognition of particular highway systems (for example, the National System of Interstate and Defense Highways), each conceived as a specific, entire, interconnected network, designed to provide a predicted traffic service, and financed and scheduled more or less as an entity. And we also note the institution of substantial mileages of controlled-access facilities, designed solely for high-volume and high-speed movement. During this period the notion of route has come to mean a continuous part of an operable network, regardless of urban or rural environment, or of jurisdictional boundaries. Design not only takes into account the interacting operational characteristics of vehicles on a given system, but also the limiting characteristics of the operators of vehicles, to the extent that available knowledge will permit. And in addition to the emergence of more broadly based principles for rational design of facilities, we note the emergence of efforts for increasingly long range planning of systems of these facilities.

The range of attention which must now be given by the agencies charged with providing highway facilities and operations, we find to be reflected in research activity. We find increasing attention being given to study of economic factors which will have to be taken into account in long range planning of systems of facilities and to study of human factors which condition not only

design but effectiveness of operation. And in passing we may note that studies of increasingly complex situations and phenomena have been made feasible by the use of highspeed computers and greater facility in the use of newer statistical techniques.

We are now witnessing, in response to certain problems of rising importance (such as the growth of great urban complexes, the interaction of transportation systems), the turning of increasing attention to the study of urban transportation, and to the interrelations of modes of transportation. Whether this is a prelude to a next period in highway transportation planning and design, or whether this is an indication we are in it, only the perspective of a decade or two hence can tell. For the purpose of this discussion of emerging trends, I shall assume we have entered the next period.

### The Transportation Systems Period

In this new period, a key criterion for planning and design may well be that of optimizing transportation service for the economy. This would mean not only taking into account, for any given system and mode of transportation, the requirements of estimated potential traffic (operations), but also the interaction with other transportation systems and the interrelation between the new or improved system and other aspects of the economic and sociological structure of the commonwealth. For example, suppose we were concerned with the substantial improvement of the highway system in a large metropolitan area. In the planning and design of this improvement, we should like to be able to estimate with fair precision *a*) the probable effect of various alternate designs on land use and economic functioning in the area, and conversely the effect of probable new land and economic development on the operating characteristics of the improved system; and *b*) the nature and level of improvement which should be sought in consideration of probable and possible other types of transportation improvement.

Some small beginning steps are being made empirically in this direction, but the incorporation of rational criteria must await the accumulation of much additional knowl-

edge, as well as the devising of analytic techniques by which this knowledge could be used in the planning-design process.

As we enter this new period in the provision of transportation, a pertinent question is, what is or what has the Highway Research Board been doing to respond to the challenge offered by these prospects? In general, we find as in the earlier periods, thought and research go hand in hand with the emergence and identification of problems and the need for new knowledge.

By way of a summary of the scope of subject matter which is indicated by the activities of committees, papers presented and discussion among those associated with the Highway Research Board, I should like to offer a brief appraisal, presented with respect to aspects of a total highway transportation system.

**1) The physical aspects:**

*a) Control of the physical environment*

The Department of Soils, Geology, and Foundations is actively concerned with many new developments in soil behavior. Two committees are working on surface and subsurface drainage. Landscaping and roadside plant life has the attention of another committee.

*b) Design of physical facilities*

Three departments and a large number of committees cover the many varied aspects of materials, analysis and design of structures, construction, layout and maintenance problems.

**2) The operational aspects:**

*a) Traffic and operations—general*

The Department of Traffic and Operations pursues an aggressive program in stimulating forward-looking research of wide variety, including terminal facilities.

*b) Vehicular characteristics*

Committees are working on both the operational and cost interaction of vehicles and road facilities.

*c) Safety*

Separate committees deal with developing improved scientific knowledge of safety and driver behavior. A special committee has been set up on night visibility.

*d) Traffic flow theory*

A new Committee has recently been formed to stimulate and accelerate the development of basic theory of traffic flow.

**3) System interactions:**

*a) With other systems producing transportation service*

This subject is under active discussion in department meetings. A number of papers have been presented relating to urban mass transit, and the problem of transit is under the purview of the special Committee on Urban Research.

*b) Economic and sociological impacts*

This area of interest is being actively discussed within the Department of Economics, Finance, and Administration, and in recent years a considerable number of papers on this subject have been presented. The Committee on Urban Research has stimulated papers and conferences, as well as plans for studies relating to land use and urban structure.

**4) The composite highway transportation system:**

*a) Economics and finance*

Several committees of the Department of Economics, Finance, and Administration give active and continuing attention to this area. A large number of papers and reports are sponsored each year, and special studies are undertaken.

*b) Administration of highway transportation affairs*

Several committees of the Department of Economics, Finance, and Administration pay active attention to the varied aspects of administration, organization, management, and legal problems through special studies and by presentation of papers and reports.

*c) Specialized facilities for high-volume operations*

Several committees and departments are studying the function, the design, and the operation of controlled-access highway facilities.

The briefest glance at the subject matter as outlined above makes readily apparent the enormous range of knowledge that is pertinent to the production of highway transportation service. Perhaps one of the greatest needs of the next several years is a synthesis of pertinent parts of existing and future knowledge into a composite set of analytical principles and criteria, on the basis of which improved predictions of system performance can be made.



## SCIENCE NEWS

### U. S. NATIONAL COMMISSION FOR UNESCO SEVENTH NATIONAL CONFERENCE

The U. S. National Commission for Unesco will hold its Seventh National Conference in Denver, Colo., September 29–October 2, 1959. The conference will be devoted entirely to Latin America—achievements in education, science, and the arts.

Chairman for the Science Section is Alan K. Manchester, Dean of Trinity College at Duke University, who has requested the assistance of the Academy–Research Council in organizing the science portion of the conference program. An advisory committee has been formed for this purpose under the chairmanship of André C. Simonpietri, Associate Director of the Office of International Relations, and a program has been developed.

The theme adopted for the Science Section is “Cooperation of the scientists and engineers of the Americas in furthering scientific training and research.” The sessions will cover the natural sciences, the social sciences, and engineering, and two full days will be devoted to discussions of major problems.

On September 30, Juan Gomez Millas, Rector of the University of Chile, will be the keynote speaker and will present the topic “Organization and structure of institutions of higher learning in Latin America as they affect scientists and engineers.” Because universities in Latin America are operated quite differently from those with which most Americans are familiar, cooperation with them requires an understanding of these unusual characteristics. Dr. Gomez Millas will develop this point and indicate how United States scientists and institutions may work effectively with their Latin American colleagues. Then J. George Harrar, Vice President of the Rockefeller Foundation, will present the United States point of view of the same topic. Afterwards as Vice Chairman of the session, he will preside over two panel discussions on the training and utilization of scientists.

On October 1, a similar procedure of pres-

entation will be followed. Carlos Chagas, Director of the Biophysics Institute at the University of Brazil, will present the principal topic “Opportunities and responsibilities for scientific research peculiar to areas of Latin America, some of which might be applicable to other areas of the world.” Merle Tuve of the Carnegie Institution of Washington and an Academy member will speak on the same subject and then preside over the two panels concerned with basic and applied research respectively.

### SYMPOSIUM ON USE OF MODELS IN FIRE RESEARCH

The Committee on Fire Research and the Fire Research Conference are planning a two-day international symposium on the use of models in fire research to be held at the Academy–Research Council building on November 9 and 10, 1959. Participants from Japan, England, France, Germany, and the United States expect to attend.

The meeting will concentrate on the use of models for predicting fire behavior on a large scale. Modeling, applied with considerable success to many combustion problems, has had negligible application in studying fire growth and spread. It should be a potent tool, but the problem is extremely complicated because of the enormous number of variables. It is hoped in this symposium to review the status of our limited knowledge of fire modeling, to consider the design of experiment to determine which dimensionless groups of variables may be ignored and which must be faithfully reproduced in the model, and to consider what progress has been made in another kind of modeling—the setting up and solution of mathematical models of the fire-spread problem.

Attendance at the symposium will be by invitation. Those actively interested in basic research on fire and the spread and growth of fire should indicate their interest and request advance registration cards. Further information about the meeting and a more detailed program will be available upon request from D. W. Thornhill, Executive Secretary, Committee on Fire Research and the Fire Research Conference.

#### AGREEMENT WITH SOVIET ACADEMY

The National Academy of Sciences and the Academy of Sciences of the U.S.S.R. on July 9, 1959, signed a two-year agreement providing for exchange visits by research scientists of each country for periods up to one year. Under the terms of the agreement, each Academy designated 20 fields of specialized scientific inquiry in which its scientists desire to observe or conduct research within the host country.

The agreement also provides for the organization by the two Academies of joint symposia dealing with scientific problems of current interest, mutual assistance in the exchange of scientific information, and for the exchange of invitations to important scientific meetings. Implementation of these provisions will substantially increase the exchange of scientists between the two countries.

The agreement between the two Academies is part of a program of cultural, technical, and educational exchanges between the two countries provided for under the Lacy-Zaroubin agreement, whose signing in 1958 was hailed by the U. S. Department of State as a "significant first step in the improvement of mutual understanding between the peoples of the United States and the Union of Soviet Socialist Republics."

The Lacy-Zaroubin agreement called upon the Academies of the two countries to effect certain of the exchanges provided for under Section IX, "Visits by Scientists." These exchanges supplement other such scientific exchanges that are taking place between the two countries, arranged by individual scientists and universities of each nation. There is no intention that the inter-Academy agreement be considered an exclusive instrument for the arrangement of such scientific exchanges.

Signed by the presidents of the American and Soviet Academies—Detlev W. Bronk and A. N. Nesmeyanov, respectively—the agreement and its appendices call upon each group to name individuals to participate in three categories of exchange visits as follows:

- 1) Approximately 20 noted scientists from each country "to deliver lectures and conduct seminars on various problems

of science and technology as well as for the purpose of studying research work in progress" during visits of up to one month;

- 2) Approximately 18 scientists to spend one month in laboratories of the opposite country observing current research in 14 designated scientific specialties; and
- 3) An additional six scientists to spend longer periods in specialized study or in the conduct of research in six designated scientific specialties.

Suggestions regarding the areas of Soviet science to be designated in the agreement, together with nominations of American scientists qualified to participate in such an exchange, were made by members of the National Academy of Sciences and the National Research Council after consultation with colleagues in all the natural sciences.

The agreement calls for each side to pay the salaries and international travel expenses of its own scientists; the receiving side is charged with responsibility for providing living quarters, medical aid, and certain local travel expenses for the visitors. The Academy has been assured of funds from the National Science Foundation and other public and private sources to defray expenses of the U. S. part of the program.

Important to the success of the program will be the cooperation of American scientific institutions and research laboratories in offering their facilities to visiting scientists from the Soviet Union and in providing leave to their own staff or faculty members for reciprocal visits abroad.

The Academy has been providing assistance for some time to American scientists and scientific institutions interested in exchange visits with Soviet scientists. The Office of International Relations will continue to provide assistance for both phases of such exchanges: preparations for visits of American scientists to the Soviet Union and for inviting Soviet scientists to visit the United States.

Inquiries concerning the inter-Academy Agreement for exchange of scientists with the Soviet Union should be addressed to the Director, Office of International Relations, National Academy of Sciences.



## NEW OFFICE OF DOCUMENTATION

The Academy-Research Council announces the establishment of a new Office of Documentation. This action is the result of long planning and consideration and is expected to fill a need repeatedly expressed by groups in and out of the Academy-Research Council.

The Director of the new Office will be Karl F. Heumann, formerly Research Director, Chemical Abstracts Service. Dr. Heumann was also Director of the Chemical-Biological Coordination Center of the National Research Council from 1952 to 1955. His training is in chemistry and he has had a long interest in problems of scientific information.

The scientific literature has grown at an unprecedented rate in recent years, and many scientists have felt that the difficulties of searching and using information have similarly increased, even to the point where bibliographic control was effectively lost. As a response to this situation, new methods and techniques have been proposed for dealing with this ever-growing collection of information. New classification and indexing schemes, new electronic equipment, new methods of storing information on film or magnetic tape, all these have been developed in a discipline loosely covered by the term documentation.

The Office of Documentation will have three major areas of interest: 1) advice to the National Science Foundation and others as appropriate in broad problems of scientific documentation, including the recording, storage, retrieval, and dissemination of information to serve the needs of science; 2) provision of a mechanism for the participation of United States scientists and documentalists in international activities relating to scientific documentation; and 3) advice and assistance to the several activities of the Academy-Research Council in the documentation problems that they encounter from time to time. Close liaison is being maintained with the National Science Foundation's Office of Science Information Service and with other interested groups.

It is anticipated that an advisory panel made up of scientists and documentalists will be created to serve the new Office.

## STUDY OF SCHOOL FIRE SAFETY PROBLEM

Responding to the multiple pressures of rapidly expanding school populations, greater competition for the tax dollar, and the consequent demand for utilization of antiquated and sub-standard school buildings, school officials throughout the nation are becoming increasingly concerned by a real dilemma facing them. How, in the light of the tremendous financial burden involved, can they support the costs of eliminating fire hazards in existing structures, achieve the required degree of fire safety to occupants in new construction, and at the same time provide for the developing educational needs of the community? When does a school building become obsolete and how much expense is justified in rehabilitating for fire safety?

To answer these and other questions the Academy-Research Council has undertaken a special study of school fire safety. The study will be conducted jointly by the Building Research Advisory Board and the Committee on Fire Research under a grant from Educational Facilities Laboratories, Inc. Chief purpose of the project is to assemble, evaluate and publish information on the question of fire safety and its dual relationship to the economics of school structures and the educational needs of communities.

The following committee has been appointed to assume responsibility for the conduct of the study for the organization of a summing-up conference in the fall, and for publication of an open report:

NORMAN J. SCHLOSSMAN, Loeb, Schlossman, and Bennett, Chicago, *Chairman*

SHIRLEY COOPER, American Association of School Administrators, *Vice Chairman*

STANLEY A. ABERCROMBIE, National Education Association, Commission on Safety Education

CHARLES T. GRANGER, JR., Fehr and Granger

RAYMOND M. HILL, Fire Prevention Bureau, Los Angeles Fire Department

ROBERT S. MOULTON, National Fire Protection Association

A. F. ROBERTSON, Fire Protection Section, National Bureau of Standards

JAMES F. STEINER, Construction and Civic Development Department, U. S. Chamber of Commerce

JAMES P. THOMPSON, Codes and Safety Standards Section, National Bureau of Standards.

## INTERNATIONAL ATOMIC ENERGY FELLOWSHIPS

Since the fall of 1958 the Academy-Research Council has administered a program of fellowships for foreign scientists visiting the United States for study in any area of the peaceful uses of atomic energy. This program, supported by the International Cooperation Administration, is carried out in cooperation with the International Atomic Energy Agency (IAEA) in Vienna.

The Atomic Energy Authorities of member countries nominate for fellowships scientific or technical personnel who will profit by one or two years study in some other member country. Nominees may specify the country of preference as well as the institution where they would like to study.

Applications for study in the United States are sent to the Office of Scientific Personnel for placement. Qualified candidates are certified to the IAEA which then makes the appointments. The Academy-Research Council arranges for the fellows' travel and subsistence. The fellowship stipend covers travel expenses, tuition, and a modest per diem allowance for the individual appointee, but not for his dependents.

To date about 40 IAEA fellows have been appointed to institutions in the United States; a still larger number representing 36 countries will be recommended for appointments in 1959-60. Fellows already appointed or under consideration are from all parts of the world with the Pacific areas, Southeast Asia, and the Near East well represented.

### AWARDS IN RADIOLOGICAL RESEARCH

The James Picker Foundation, with the advice and cooperation of the Academy-Research Council initiated its program of research grants and fellowships in 1950 and expanded it to include scholar grants in 1953. Upon recommendation of the Committee on Radiology, the Picker Foundation has awarded eight research grants, five fellowships, and three grants for scholars for the academic year, 1959-60. These awards total approximately \$70,000.

The names of the recipients and the na-

ture and location of their research are given below under the type of award.

### Research Grants:

- Julian L. Ambrus, Roswell Park Memorial Institute, Buffalo, N. Y.  
Development of methods to detect areas of myeloid metaplasia.
- W. Peter Cockshott, University College Hospital, Ibadan, Nigeria  
Initiation of a program of radiological research.
- David W. Cugell, Northwestern University School of Medicine  
Investigation of bronchial dynamics in health.
- Bertil Jacobson, Karolinska Institutet, Stockholm, Sweden  
Quantitative *in vivo* analysis of non-radioactive iodine of the thyroid.
- Gwilym S. Lodwick and Theodore E. Keats, University of Missouri Medical Center  
Study of the vascular and osseous changes occurring in hypertrophic pulmonary osteoarthropathy.
- Edward B. D. Neuhauser and Abraham M. Rudolph, Children's Medical Center, Harvard Medical School  
Continued study of the radiological features of the pulmonary vascular system.
- Robert Shapiro, Hospital of St. Raphael, New Haven, Conn.  
Investigation of renal venography and inferior vena cavography.
- Carl Wegelius, University of Turku, Finland  
Research on the use of the narrow beam of X-rays in tomographic methods.

### Grants for Scholars:

- Hugh H. Hayes, Jr., Correlative studies of the roentgenologic and gross anatomy of the central nervous system—Johns Hopkins University School of Medicine, in the laboratory of Russell H. Morgan.
- Nels M. Strandjord, Research on the X-ray diagnosis of gastric malignancy—University of Chicago School of Medicine, in the laboratory of Robert D. Moseley, Jr.
- Joseph E. Whitley, Radiographic studies of positive intrapulmonary pressure and of heart defects and research on the diagnosis of pancreatic and brain tumors by radioisotopic means—Bowman Gray School of Medicine, Wake Forest College, in the laboratory of I. Meschan.

### Fellowships:

- James A. Belli, Study of the influence of temperature upon the biological effectiveness of various qualities of ionizing radiation—Southwestern Medical School, University of Texas, under the guidance of Frederick J. Bonte.
- Ahmad Hatam, Study of the functional dynamics of the normal physiologic activity and pathologic variations of the lower urinary tract—University of Louisville School of Medicine, under the guidance of Everett L. Pirkey.

Gaston R. Vantrappen, Application of fluorocinematography to the study of gastrointestinal and biliary tract physiology and pathophysiology—University of Louvain Medical School, Louvain, Belgium, under the guidance of J. Vandenbroucke.

Jose A. Veiga-Pires, Basic radiological investigation using post-mortem material—Royal Northern Hospital, Holloway, London, England, under the guidance of L. S. Carstairs, P. M. Peters, and A. Jennings.

Edward C. Wilson, Critical analysis of gastrointestinal motility, using the technique of cinefluorography and a telemetering capsule—University of Virginia Hospital, under the guidance of James Respass.

#### CONFERENCES ON PACIFIC SCIENCE ACTIVITIES

Harold J. Coolidge, Executive Director of the Pacific Science Board, recently returned from a trip to the islands and countries of the South Pacific where he participated in a series of conferences either as an observer or as an official in connection with the work of the Board.

From April 7-24, he attended the United Nations Economic and Social Council meeting in Mexico City as an observer for the International Union for the Conservation of Nature. The United States delegation presented a resolution asking the United Nations to establish a world list of national parks and equivalent areas. This resolution was seconded by France, Mexico, Pakistan, Sudan, the United Kingdom, and Venezuela and was adopted unanimously.

Following a series of conferences in Honolulu, Fiji, and New Caledonia, Mr. Coolidge next served as the Pacific Science Board and Bernice P. Bishop Museum observer at the Fourth South Pacific Peoples Conference held at Rabaul, New Britain, from April 29 to May 13. The Conference was attended by 48 delegates from 16 territories of the South Pacific and the Kingdom of Tonga.

Mr. Coolidge attended a series of conferences in Hong Kong, Bangkok, Vientiane (Laos), Saigon, and Guam where the work and interests of the Pacific Science Board were reviewed. Among the activities discussed were: *a*) arrangements for the local logistic support of the survey of marine resources of the South China Sea and the Gulf of Thailand, a joint proj-

ect of Scripps Institution of Oceanography and the Vanderbilt Foundation of Stanford University supported by an International Cooperation Administration grant; *b*) support for the establishment of national parks in Southeast Asian countries; *c*) ways of strengthening science in the Pacific areas through U. S. Information Agencies; and *d*) problems arising from the exchange of scientific information and publications in connection with a project sponsored jointly by the Pacific Science Board and the National Science Foundation.

Throughout his trip Mr. Coolidge, in his capacity as Secretary General of the Tenth Pacific Science Congress, had an opportunity to inform scientific groups of the advance plans for the Congress, which will be held in Honolulu, August 21-September 6, 1961, under the sponsorship of the Academy-Research Council and the Bernice P. Bishop Museum.

#### THE SKYLINE CONFERENCE

On May 1-3, 1959, the Division of Mathematics with the support of the National Science Foundation sponsored a Conference on the Design and Conduct of Research Programs in Weather Modification. A group of 30 scientists participated in the conference held at Big Meadows Lodge on the Skyline Drive, Shenandoah National Park, Va.

The locale and organization of the conference was patterned after the well-known Adirondack Conference first held in New York State in October 1957. The Skyline Conference was under the general chairmanship of Samuel S. Wilks, Chairman of the Division of Mathematics. In the group of 30 were meteorologists and statisticians invited from many parts of the country to explore the application of statistical methods to meteorological research programs in weather modification, to review and examine the problems which require solution, and to discuss approaches which might be most fruitful in arriving at solutions having a direct and important bearing on the future activities in fundamental research relevant to weather modification.

During the two and one-half days of the conference, the group participated in

informal sessions designed to inform and provoke discussions among the conferees on various aspects of cloud physics and precipitation, such as the chemical, physical, and electrical phenomena of clouds and cloud-free air as well as the statistical evaluation and tests applicable to various cloud physics and weather modification programs.

The Friday morning discussion period was guided by Glenn W. Brier, U. S. Weather Bureau, during which a number of meteorological background topics were discussed by several of the conference participants, ranging from warm and cold status decks and fogs to orographic and non-orographic cumuli, Hatteras and West Coast storms, hail and lightning suppression, hurricanes, and periodic seeding.

The Friday evening session was devoted to statistical evaluations and tests which have been made or might be suitable for application to certain research programs. Under the leadership of Roscoe R. Braham, Jr., University of Chicago, the deliberations during this session revealed that both the meteorologists and statisticians have a considerable collaborative task ahead of them in designing and evaluating experiments in research programs concerned with weather modification.

On Saturday, May 2, the meteorological and statistical issues were pursued with renewed vigor under the leadership of Max Woodbury of New York University and Eugene Bollay of the Borg-Warner Corporation. In fact, interest in the problems under discussion was so strong that the participants gave up their free afternoon period in order that more time could be devoted to the formulation of conclusions and recommendations for guidance in the design and conduct of future research efforts in weather modification.

The final session on Sunday morning, May 3, under the dual leadership of Dr. Wilks and Horace R. Byers, University of Chicago, was spent on rounding out the sense of the conference on various major points and formulating conclusions and recommendations which the conferees felt should be the nucleus of the report to appear in the fall on the work of the conference.

#### NATIONAL SCIENCE FOUNDATION POSTDOCTORAL FELLOWSHIPS

For the fifth consecutive year, the National Science Foundation has announced a second award period for postdoctoral fellowships. These fellowships are for advanced study and training in the natural sciences, including anthropology, engineering and psychology, and in certain social sciences which conform to accepted standards of scientific inquiry. Citizens of the United States who have obtained a Ph.D., M.D., D.D.S., or D.V.M. degree, or who have completed all the academic requirements for these doctorates, and who desire advanced training toward a career in research are eligible.

The Fellowship Office of the Academy-Research Council will receive applications for these fellowships, evaluate them through its fellowships boards, and nominate candidates for awards to the National Science Foundation.

The deadline for receipt of applications by the Fellowship Office is September 1 and announcement of the awards will be made by the National Science Foundation on October 15, 1959.

#### SUMMER CONFERENCES AT WOODS HOLE

The Academy-Research Council has arranged for a series of conferences and study groups to be held during the summer at the Whitney Estate in Woods Hole, Mass. This year's program will not, as in previous years, be devoted to a single activity but will bring together hundreds of scientists and scholars in many different fields to discuss a wide variety of problems in meetings lasting from several days to several weeks.

Members of the Academy-Research Council staff who have spent previous summers at Woods Hole are most gratified at being able to continue the summer program at Woods Hole, not only because the physical environment seems so favorable to fruitful discussion, but also because the guests will have an opportunity to participate in the informal activities of the lively scientific community composed of the Marine Biological Laboratory, the Woods Hole Oceanographic Institute, the U. S.



Fish and Wildlife Service, and members of the Academy-Research Council in summer residence at Woods Hole and Falmouth.

The first group to meet at the Whitney Estate this summer under Academy-Research Council auspices was composed of 75 geophysicists, who assembled there, June 3-5, to discuss the physics of cloud precipitation in a conference organized by the American Geophysical Union. Other Academy-Research Council groups which have met or plan to meet at Woods Hole this summer include the following:

Materials Advisory Board, June 22-28  
Armed Forces-National Research Council Committee on Bio-Astronautics, July 15-24  
Maritime Research Advisory Committee, August 10-31  
Advisory Board on Education, September 9-18

In addition the Academy-Research Council will be host to certain governmental groups with which it has worked closely, such as the Defense Science Board, which will meet at the Whitney Estate on September 10 and 11.

#### PROSTHETICS RESEARCH AND INFORMATION

For a number of years the Academy-Research Council has served in an advisory, consulting, and correlating capacity to the prosthetics and orthotics research and development programs of the following Government agencies: Veterans Administration; the Army; the Navy; and the Office of Vocational Rehabilitation, the National Institutes of Health, and the Children's Bureau, all under the Department of Health, Education and Welfare.

These advisory services have been performed through the Prosthetics Research Board and its predecessor, the Advisory Committee on Artificial Limbs, both jointly sponsored by the Divisions of Medical Sciences and of Engineering and Industrial Research. Initially these bodies were under the chairmanship of Paul Klopsteg, formerly Associate Director of the National Science Foundation. In recent years Brig. Gen. F. S. Strong, Jr., U. S. Army (Ret.), has served as chairman of these groups.

Upon its own recommendation the Pros-

thetics Research Board has now been dissolved, with the appreciation and thanks of the Academy-Research Council to each and every member for their combined and individual contributions to the significant development of interest and activity in the national research program designed to better the position of amputees.

Continuing in accordance with the Prosthetics Research Board's recommendation, its responsibilities have now been assigned to two major committees which have been functioning as units of the Board. With advisory responsibilities in the areas indicated by their names, the Committee on Prosthetics Research and Development will operate as a committee of the Division of Engineering and Industrial Research, while the companion Committee on Prosthetics Education and Information will operate as a committee of the Division of Medical Sciences. The membership of the two committees and their chairmen are as follows:

##### Committee on Prosthetics Research and Development:

HOWARD EBERHART, Department of Civil Engineering, University of California at Berkeley, *Chairman*  
GEORGE T. AITKEN, Mary Free Bed Guild Children's Hospital, Grand Rapids  
CHARLES O. BECHTOL, University of California Medical Center, Los Angeles  
CAPT. R. C. DOOLITTLE, U. S. Naval Hospital, Oakland, Calif.  
HERBERT ELFTMAN, Columbia University College of Physicians and Surgeons  
SIDNEY FISHMAN, New York University College of Engineering  
CHESTER C. HADDAN, Gaines Orthopedic Appliances, Inc.  
VERNE T. INMAN, University of California Medical Center, Los Angeles  
FRED LEONARD, Army Prosthetics Research Laboratory, Walter Reed Army Medical Center  
C. LESLIE MITCHELL, Henry Ford Hospital, Detroit  
ALFRED R. SHANDS, JR., Alfred I. duPont Institute of the Nemours Foundation  
ANTHONY STAROS, Veterans Administration Prosthetics Center, New York City  
AUGUSTUS THORNDIKE, Harvard University  
HOWARD R. THRANHARDT, J. E. Hanger, Inc.

##### Committee on Prosthetics Education and Information:

ALFRED R. SHANDS, JR., Alfred I. duPont Institute of the Nemours Foundation, *Chairman*  
DOROTHY BAETHKE, School for Physical Therapy, University of Pennsylvania  
CHARLES O. BECHTOL, University of California Medical Center, Los Angeles

WILLIAM M. BERNSTOCK, Veterans Administration,  
New York City  
CLINTON L. COMPERE, Northwestern University  
MC CARTHY HANGER, JR., J. E. Hanger, Inc.  
W. FRANK HARMON, Atlanta Brace Shop  
ROY M. HOOVER, Woodrow Wilson Rehabilitation  
Center, Roanoke, Va.  
HERBERT N. PARK, Veterans Administration Central  
Office, Washington, D. C.  
COL. RUTH A. ROBINSON, Office of the Surgeon  
General, U. S. Army  
WALTER A. L. THOMPSON, New York University  
Bellevue Postgraduate Medical School

#### STAFF APPOINTMENTS

**Janet Mackie** has accepted a half-time appointment to assist in the Tropical Medicine Survey under the direction of Willard H. Wright. Dr. Mackie received her M.D. degree and diploma in tropical medicine and hygiene in London and had extensive field experience in Africa before her marriage to the late Thomas Mackie brought her to this country. After serving as a consultant in Latin America during the war, she taught preventive medicine at Bowman Gray School of Medicine and then joined the U. S. Public Health Service, where her work took her to Geneva, Bangkok, and Indian reservations in the United States, until her retirement in 1958.

The Division of Medical Sciences has announced the appointment of **Thomas E. Shea, Jr.**, effective July 15 following his retirement from the U. S. Navy. He will serve primarily as Executive Secretary to the Atomic Bomb Casualty Commission. Mr. Shea received his B.A. degree in chemistry from LaSalle College in 1935 and his M.S. degree in Industrial Hygiene Engineering from the University of Pennsylvania in 1940. He also attended a 15-month course at the Oak Ridge Institute of Nuclear Studies. Since 1947 Mr. Shea's duties have been principally concerned with projects on radiation protection and production of radioisotopes for use in the clinical laboratory and biochemical research work. He was a Navy member of a tri-service study group charged with the study and programming of certain effects of nuclear weapons on the world's biosphere, and was a scientific member of Task Force 7 during tests at Eniwetok during 1956.

The Office of Scientific Personnel has announced the appointment of **Harold H. Plough** as Assistant to the Director. Dr. Plough received his Ph.D. degree from Columbia University in 1917 centering his interest on the then new field of genetics. From Columbia he went to Amherst College where he remained until his retirement as Chairman of the Biology Department in June 1959. Dr. Plough is handling that portion of the fellowship program of the International Atomic Energy Agency that applies to fellowships tenable in the United States.

**Harry B. Benford**, on leave from the University of Michigan, has been appointed Executive Director of the Maritime Research Advisory Committee and assumed his new responsibilities early in June. Professor Benford, associate professor in the Department of Naval Architecture and Marine Engineering at the University, has a background experience not only in teaching, but also in full-time industrial service with the Newport News Shipbuilding and Dry Dock Company and in professional consulting work in ship design, construction and propulsion including nuclear propulsion; in wind loads and hull stress analyses; in the economics of maritime transport; and in research in ship design, methods of construction, and cargo transportation.

**Milton C. Coon, Jr.**, has been appointed Executive Director of the Building Research Institute having served as Acting Executive Director since last September. This action, together with the appointment 7 months ago of **Robert M. Dillon** as Executive Director of the Building Research Advisory Board, effectively separates the activities of the two organizations, which were formerly headed jointly by **William H. Scheick**.

Mr. Coon has a background of experience in building industry organizational work, and was most recently associated with the Tile Contractors Association of America. He came to the Building Research Institute in September 1957 and has been in charge of business administration, membership promotion and maintenance, and physical arrangement for the various meetings of the Institute.



The Building Research Advisory Board (BRAB) has announced the appointment of a 3-man team to handle staff responsibility for the Study on School Fire Safety Problems (*see* p. 59). **I. Perry Clark, Jr.**, will serve as Project Director, and **Robert L. McKee** and **Melvin W. Isenberg** will serve as part-time Professional Associates. Mr. Clark received his B. S. degree in mechanical engineering from Oklahoma Agricultural and Mechanical College in 1939, and was formerly a BRAB Staff Engineer. Dr. McKee received his Ph.D. degree in education from Stanford University in 1955 and is currently District Superintendent of Schools of Galt, Calif. Professor Isenberg received his M. S. degree in architectural engineering from Pennsylvania State University in 1949 and is an Associate Professor there now.

The Building Research Advisory Board has also made two new appointments to the staff to handle the work related to the Federal Construction Council and the Federal Housing Administration. **Francis A. Govan** has been appointed Project Director with direct responsibility for the advisory services given the Federal Construction Council. He received his B. S. degree in engineering from the U. S. Merchant Marine Academy in 1948 and has been serving BRAB as a Staff Engineer. **James R. Smith**, who received his B. S. degree in architectural engineering from the Catholic University of America in 1953, is serving as a Staff Engineer working on the engineering problems under study for the Federal Construction Council. Mr. Smith was previously a specification writer for the U. S. Navy Bureau of Yards and Docks.

## RECORD OF MEETINGS

### May

- 1 Division of Earth Sciences, Executive Committee  
Committee on Oceanography  
Committee on Blood and Related Problems  
Committee on Microbiology, *Chicago*
- 1-3 Conference on the Design and Conduct of Research Programs in Weather Modification, *Shenandoah National Park, Va.*
- 2 Division of Earth Sciences, Conference on Project Plowshare (Annual Meeting)  
Armed Forces-National Research Council Committee on Bio-Astronautics, Executive Council, *La Jolla, Calif.*  
USA National Committee, International Union of Pure and Applied Physics  
Subcommittee on Radiochemistry
- 3 Special Moho Committee  
American Geophysical Union, Executive Committee  
American Geophysical Union, Russian Translation Board  
Executive Committee of USA National Committee, International Scientific Radio Union

### May

- 4 Committee on Heat Attenuation in Clothing Systems, *New York City*  
Advisory Panel to National Bureau of Standards Data Processing Division  
USA National Committee, International Scientific Radio Union
- 4-5 Prosthetics Research Board
- 4-7 American Geophysical Union, Annual Meeting
- 5 Committee on Cereal and Baked Products
- 6 USA National Committee, International Scientific Radio Union
- 7 Materials Advisory Board  
Ad hoc Committee on Soil Burial Test Method
- 8 Special Committee on Highway Research Priorities
- 11 Committee on Scope and Conduct of Materials Research  
Advisory Committee for Research Associateships  
Committee on Reevaluation of Architectural Metal Curtain Walls
- 12 Subcommittee on Waste Disposal  
Committee on Textile Dyeing and Finishing, *Natick, Mass.*

May		May	
12-13	Maritime Cargo Transportation Conference	26	Prevention of Deterioration Center, Scientific Advisory Committee and Services Technical Committee, Joint Annual Meeting
14	Advisory Panel to the National Bureau of Standards Radio Standards Laboratory, <i>Boulder, Colo.</i> Committee on Science in Unesco Committee on High Temperature Bearings Building Research Institute, Research Committee, <i>New York</i>	26-27	Committee on Radiation Preservation of Food, <i>Denver</i>
15	Highway Research Board, Department of Maintenance, <i>Chicago</i> Building Research Advisory Board and West Berlin Housing Experts Ad hoc Panel on a Proposed Follow-up Study of Radiologists	27	Ad hoc Planning Committee of USA National Committee, International Geographical Union Planning Committee for Sandwich Panel Design Criteria, <i>New York City</i>
17	Committee on Foods, <i>Philadelphia</i>	28	Advisory Panel to the National Bureau of Standards Electricity and Electronics Division
18	Advisory Panel to the National Bureau of Standards Cryogenic Engineering Laboratory, <i>Boulder, Colo.</i>	29	Committee on Pathology Armed Forces-National Research Council Committee on Vision, Executive Council
19	Ad hoc Subcommittee on Food Additives Codex, <i>Philadelphia</i> Advisory Panel to the National Bureau of Standards Radio Propagation Laboratory, <i>Boulder, Colo.</i> Ad hoc Group on Unesco Arid Zones Major Project	June	
20	Committee on Fellowship Selection Techniques Food Protection Committee, Ad hoc Subcommittee on Public Information, <i>Philadelphia</i> Planning Committee for Building Research Institute Fall Conferences	1-2	Committee on Africa South of the Sahara, <i>New York City</i>
20-21	Conference on Building Illumination, <i>Cleveland</i>	2	Subcommittee on Carcinogenesis, <i>Urbana, Ill.</i> Committee on Sanitary Engineering and Environment Advisory Panel to the National Bureau of Standards Mineral Products Division
21	Committee on Body Armor, <i>Natick, Mass.</i> Subcommittee on Food Technology, <i>Philadelphia</i>	3	Committee on Editing "Mathematical Tables and Other Aids to Computation" Agency Administrators and Advisory Committee to the Federal Construction Council, Annual Meeting
22	Committee on Oceanography, <i>New York City</i> Subcommittee on Food Sanitation Advisory Panel to the National Bureau of Standards Organic and Fibrous Materials Division	3-4	Advisory Committee on Civil Defense
23	USA National Committee, International Union Against Cancer	3-5	American Geophysical Union Conference on Cloud Physics, <i>Woods Hole, Mass.</i>
23-24	Committee on Human Environments in Central Africa, Senior Staff, <i>Stanford, Calif.</i> Committee on Oceanography	4	Committee on Textile Fabrics, <i>Natick, Mass.</i>
25	Committee on the Skeletal System Committee on the Cardiovascular System	4-5	Committee on International Exchange of Persons
25-27	Federal Construction Council, Task Group on High-Temperature Hot-Water Systems	5	Federal Construction Council, Task Group on Under-Ground Heat Distribution Systems Maritime Research Advisory Committee
		5-6	Committee on Naval Medical Research
		8-10	Building Research Advisory Board, Advisory Committee on Residential Building Sewers
		9-10	National Advisory Committee for AASHO Road Test, <i>LaSalle, Ill.</i> Committee on Behavioral Sciences, <i>New York City</i>
		10	Institute of Laboratory Animal Resources, Executive Committee

## June

- 11-12 Building Research Advisory Board, Technical Studies Advisory Committee
- 12-13 Highway Research Board, Executive Committee, *Chicago*
- 13 Division of Earth Sciences, Executive Committee
- 14 National Academy of Sciences-National Research Council, Governing Board
- 15 Plastics Study Group Planning Committee
- 16-17 Committee on Climatology, Advisory to the Weather Bureau, *Suitland, Md.*
- 17 Subcommittee on Research Reactors, *Gatlinburg, Tenn.*
- 18 Committee on Scope and Conduct of Materials Research  
Highway Research Board, Committee on Photogrammetry and Aerial Survey, *Denver*  
Highway Research Board and Russian Scientists on Soil and Foundation Engineering  
Committee on Shock

## June

- 18 Subcommittee on Plasma  
Committee on Agricultural Pests
- 19 Committee on Trauma  
Office of Scientific Personnel, Advisory Committee  
Committee on Shock and Committee on Trauma, Joint Meeting
- 22 Committee on Atmospheric Sciences
- 22-23 Conference on Certified Chemicals
- 23-24 Advisory Panel to the National Bureau of Standards Chemistry Division
- 24-26 Armed Forces-National Research Council Committee on Vision, Working Group No. 6
- 26 Building Operation and Maintenance Study Group Planning Committee, *New York City*  
Advisory Panel on Ship Operations
- 29 Food Protection Committee
- 30 Building Research Advisory Board, Advisory Committee on Ducts Encased in and under Concrete Slabs

## NEW PUBLICATIONS

Brieger, F. G., et al. *Races of Maize in Brazil and Other Eastern South American Countries*. Washington, NAS-NRC, 1958. (NAS-NRC Publication 593.) 283 p., illus. \$2.00.

Govan, Francis A., ed. *Selection and Maintenance of Air Filters. Report . . . for the Federal Construction Council by Task Group T-28*. Washington, NAS-NRC, Building Research Advisory Board, 1959. (NAS-NRC Publication 703. Federal Construction Council, Technical Report No. 34.) 40 p. \$1.50.

Lodge, James P., Jr., ed. *Atmospheric Chemistry of Chlorine and Sulfur Compounds. Proceedings of a Symposium Held at the Robert A. Taft Sanitary Engineering Center, Cincinnati, Ohio, November 4-6, 1957 . . .* Washington, NAS-NRC, American Geophysical Union, 1959. (NAS-NRC Publication 652. Geophysical Monograph No. 3.) 129 p., illus. \$5.50.

National Academy of Sciences. Committee on Effects of Atomic Radiation on Oceanography and Fisheries. *Considerations on the Disposal of Radioactive Wastes from Nuclear-Powered Ships into the Marine Environment*. Washington, 1959. (NAS-NRC Publication 658.) 52 p.

National Research Council. Committee on Oceanography. *Radioactive Waste Disposal into Atlantic and Gulf Coastal Waters*. Washington, 1959. (NAS-NRC Publication 655.) 37 p. \$1.00.

National Research Council. Committee on Oceanography. *Oceanography 1960 to 1970. 3-Ocean Resources; 7-Engineering Needs for Ocean Exploration. Chapters of a Report in Progress*. Washington, NAS-NRC, 1959. 30 p. and 22 p.

National Research Council. Highway Research Board. *Bituminous Patching Mixtures and Seal Coats . . .* Washington, 1959. (NAS-NRC Publication 668. Highway Research Board Bulletin 215.) 37 p., illus. \$0.80.

National Research Council. Highway Research Board. *Characteristics of Vehicle Operators . . .* Washington, 1959. (NAS-NRC Publication 665. Highway Research Board Bulletin 212.) 37 p., illus. \$0.80.

National Research Council. Highway Research Board. *Concrete Pavement Design Research, 1958 . . .* Washington, 1959. (NAS-NRC Publication 670. Highway Research Board Bulletin 217.) 49 p., illus. \$1.00.

National Research Council. Highway Research Board. *Continuous Steel Reinforcement for Experimental Concrete Pavements . . .* Washington, 1959. (NAS-NRC Publication 667. Highway Research Board Bulletin 214.) 113 p. \$2.40.

National Research Council. Highway Research Board. *Effects of Concrete Characteristics on the Pulse Velocity—a Symposium . . .* Washington, 1959. (NAS-NRC Publication 639. Highway Research Board Bulletin 206.) 74 p., illus. \$1.60.

- National Research Council. Highway Research Board. *Flexible Pavement Design—Research and Development 1958* . . . Washington, 1959. (NAS-NRC Publication 663. Highway Research Board Bulletin 210.) 61 p., illus. \$1.20.
- National Research Council. Highway Research Board. *Foundation Exploration* . . . Washington, 1959. (NAS-NRC Publication 673. Highway Research Board Special Report 44.) 21 p., illus. \$0.80.
- National Research Council. Highway Research Board. *Frost Effects in Soils and on Pavement Surfaces* . . . Washington, 1959. (NAS-NRC Publication 671. Highway Research Board Bulletin 218.) 48 p., illus. \$1.00.
- National Research Council. Highway Research Board. *Highway System Classification, a Legal Analysis, Part I. A Report of the Highway Laws Project*. Washington, 1959. (NAS-NRC Publication 638. Highway Research Board Special Report 42.) 91 p., illus. \$3.20.
- National Research Council. Highway Research Board. *Landslide Occurrence and Analysis* . . . Washington, 1959. (NAS-NRC Publication 669. Highway Research Board Bulletin 216.) 43 p. \$0.80.
- National Research Council. Highway Research Board. *Load-Carrying Capacity of Roads as Affected by Frost Action, Final Report* . . . Washington, 1959. (NAS-NRC Publication 640. Highway Research Board Bulletin 207.) 30 p., illus. \$0.80.
- National Research Council. Highway Research Board. *Sealers for Joints and Cracks in Concrete Pavements* . . . Washington, 1959. (NAS-NRC Publication 664. Highway Research Board Bulletin 211.) 22 p., illus. \$0.50.
- National Research Council. Highway Research Board. *Selective Cutting of Roadside Vegetation for Improved Highway Safety, Appearance and Use* . . . Washington, 1959. (NAS-NRC Publication 672. Highway Research Board Special Report 43.) 42 p., illus. \$1.20.
- National Research Council. Highway Research Board. *Soil and Materials Surveys by Use of Aerial Photographs* . . . Washington, 1959. (NAS-NRC Publication 666. Highway Research Board Bulletin 213.) 52 p., illus. \$1.20.
- National Research Council. Highway Research Board. *Subsurface Drainage of Highways and Airports* . . . Washington, 1959. (NAS-NRC Publication 662. Highway Research Board Bulletin 209.) 21 p., illus. \$0.50.
- National Research Council. Highway Research Board. *Traffic Accident Studies, 1958* . . . Washington, 1959. (NAS-NRC Publication 661. Highway Research Board Bulletin 208.) 83 p., illus. \$1.60.
- National Research Council. Institute of Laboratory Animal Resources. *Animals for Research, a Catalogue of Commercial Sources*. 2nd ed. Washington, 1959. 45 p. \$1.50.
- National Research Council. Ship Structure Committee. *Annual Report [for 1958-59]* . . . Washington, 1959. [68] p.
- National Research Council. Ship Structure Committee. *Fourth Technical Progress Report* . . . Washington, NAS-NRC, 1959. 29 p.
- U. S. Office of Naval Research. *Second Coastal Geography Conference. Held on April 6-9, 1959, at the Coastal Studies Institute, Louisiana State University* . . . Washington, 1959. 472 p., illus.

### Notice of Academy Meetings

#### NATIONAL ACADEMY OF SCIENCES

Autumn Meeting, Indiana University, Bloomington, Ind., November 16-18, 1959  
Annual Meeting, Washington, D. C., April 25-27, 1960

#### NATIONAL RESEARCH COUNCIL

Annual Meeting, Washington, D. C., March 24-26, 1960

#### NATIONAL ACADEMY OF SCIENCES-NATIONAL RESEARCH COUNCIL

Governing Board, Washington, D. C., October 11, 1959  
Governing Board, Washington, D. C., December 13, 1959

NATIONAL ACADEMY OF SCIENCES  
NATIONAL RESEARCH COUNCIL

President  
DETLEV W. BRONK

Vice President  
FARRINGTON DANIELS

Treasurer  
WILLIAM J. ROBBINS

Home Secretary  
HUGH L. DRYDEN

Foreign Secretary  
H. P. ROBERTSON

COUNCIL OF THE ACADEMY

ROGER ADAMS  
DETLEV W. BRONK  
FARRINGTON DANIELS  
HUGH L. DRYDEN

THOMAS FRANCIS, JR.  
W. V. HOUSTON  
SAUNDERS MAC LANE  
WILLIAM J. ROBBINS

H. P. ROBERTSON  
FREDERICK SEITZ  
HARRY L. SHAPIRO

---

Executive Officer  
S. DOUGLAS CORNELL

Business Manager  
G. DONALD MEID

DIVISIONS OF THE RESEARCH COUNCIL

Anthropology and Psychology:  
NEAL E. MILLER, *Chairman*  
GLEN FINCH, *Executive Secretary*

Engineering and Industrial Research:  
E. L. COCHRANE, *Chairman*  
LOUIS JORDAN, *Executive Secretary*

Biology and Agriculture:  
H. BURR STEINBACH, *Chairman*  
FRANK L. CAMPBELL, *Executive Secretary*

Mathematics:  
SAMUEL S. WILKS, *Chairman*  
MONROE H. MARTIN, *Executive Secretary*

Chemistry and Chemical Technology:  
ERNEST H. VOLWILER, *Chairman*  
CLEM O. MILLER, *Executive Secretary*

Medical Sciences:  
R. KEITH CANNAN, *Chairman*

Earth Sciences:  
JOHN N. ADKINS, *Chairman*  
WILLIAM R. THURSTON, *Executive Secretary*

Physical Sciences:  
BRIAN O'BRIEN, *Chairman*  
JOHN S. COLEMAN, *Executive Secretary*

---

Office of International Relations:  
WALLACE W. ATWOOD, JR., *Director*

Office of Scientific Personnel:  
M. H. TRYTTEN, *Director*

*The search for Truth is in one way hard  
and in another easy. For it is evident that no one  
can master it fully nor miss it wholly. But each adds  
a little to our knowledge of Nature, and from all  
the facts assembled there arises a certain grandeur.*

—ARISTOTLE



